ARITHMETIC.

Conducted by B.F.FINKEL, Kidder, Missouri. All Contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

35. Proposed by B. F. FINKEL, Professor of Mathematics in Kidder Institute, Kidder, Missouri.

Between Sing-Sing and Tarry-Town, I met my worthy friend, John Brown,
And seven daughters, riding nags, and every one had seven bags:
In every bag were thirty cats, and every cat had forty rats,
Besides a brood of fifty kittens. All *but* the nags were wearing mittens:
Mittens, kittens—cats, rats—bags, nags—Browns,
How many were met between the towns?

[From *Mattoon's Common Arithmetic*].

II. Solution by T. W. PALMER, Professor of Mathematics, University, Alabama.

1. $8=$No. of Browns met.
2. $8=8\times 1=$No. of nags.
3. $112=16\times 7=$No. of bags, (each bag and each Brown had 7).
4. $3360=112\times 30=$No. of cats.
5. $134400=3360\times 40=$No. of rats.
6. $168000=3360\times 50=$No. of kittens.
7. $16=8\times 2=$No. of mittens worn by Browns.
8. $13440=3360\times 4=$No. of mittens worn by cats.
9. $537600=134400\times 4=$No. of mittens worn by rats.
10. $672000=168000\times 4=$No. of mittens worn by kittens.

$1528944=$Browns+nags+bags+cats+rats+kittens+mittens.

NOTE—Mr. Horn in January Number has probably given correct solution, but the language of the example will admit of the above interpretation. *T. W. P.*

Remark on Solution of Number 35 by COOPER D. SCHMITT, Knoxville, Tennessee.

Mr. Horn's addition is not correct to obtain line numbered 7. I would suggest that as cats, rats and kittens have *four* legs each that *four* mittens be assigned to each, this will make the answer to the problem, 764488. I can not see Mr. Mattoon's interpretation of the problem.

38. Proposed by J. A. CALDERHEAD, B. Sc., Superintendent of Schools, Limaville, Ohio.

What must be the thickness of a 36-inch shell, in order that it may weigh 1 ton: supposing a 13-inch shell to weigh 200 pounds, when two inches thick?

III. Solution by P. S. BERG, Apple Creek, Ohio.

$$\frac{13^3\pi}{6}-\frac{9^3\pi}{6}=\frac{1468\pi}{6}, \text{ solid contents of 13-inch shell.}$$

$$\frac{1468\pi}{6}\times 10=\frac{14680\pi}{6}, \text{ solid contents of 36-inch shell}$$

$$\frac{36^3\pi}{6}-\frac{14680\pi}{6}=\frac{31976\pi}{6}, \text{ volume of hollow within 36-inch shell}$$

$$\sqrt[3]{\frac{31976\pi}{6}\div\frac{\pi}{6}}=31.736, \text{ diameter of hollow within 36-inch shell.}$$

$(36-31.736)\div 2=2.132$ in. thickness of shell.

This problem was solved with same result, by *Hon. Josiah H. Drummond, J. F. W. Scheffer, Frank Horn J. K. Ellwood, and Cooper D. Schmitt.*

39. Proposed by P. C. CULLEN, Superintendent of Schools, Brady, Nebraska.

A, B, and C start from same point at same time. A north at rate of three miles per hour. B east at rate of four miles and C west at rate of five miles per hour. B at end of two hours starts at such an angle as to intersect A. How long after starting must C start north-west in order to meet A and B at common point ?

Solution by HON. JOSIAH H. DRUMMOND, LL. D., Portland, Maine, and J. W. WATSON, Middle Creek, Ohio.

Let x be the time after B turns till he meets A. The route of both is a right angle triangle with base 8; perpendicular $3x+6$, and hypotenuse $4x$. Hence, $16x^2=(3x+6)^2+64$, whence $x=7\frac{1}{7}$ or -2. But the -2 value makes them turn back and meet at point of starting. Let y=time before C turns. Then $7\frac{1}{7}+2-y$=time after he turns. $3x+6=\frac{192}{7}$=perpendicular, $5y$=base, and $5(\frac{64}{7}-y)$=hypotenuse. Hence, $25y^2+(\frac{192}{7})^2=25(\frac{64}{7}-y)^2$, whence $y=2\frac{162}{175}$ hours.

Excellent solutions of this problem were received from *G. B. M. Zerr. P. S. Berg, J. K. Ellwood, Cooper D. Schmitt, and J. F. W. Scheffer.*

40. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

Find the market-price of $m=3\%$-stock, in order that it may yield $n=3\frac{1}{3}\%$ interest after deducting $d=\$\frac{7}{20}$ from every $S=\$12$.

Solution by the PROPOSER.

According to the conditions of the problem, the deduction from the the par (\$100) value of a share is $100d/S$ dollars, $=\$\frac{35}{12}$: therefore, 100 $(1-d/S)$ dollars are to yield \$$m$ interest. In order to yield \$$n$ interest,

the market-price must be $P=100\left(\frac{m}{n}\right)\left(1-\frac{d}{S}\right)$dollars, $=\$87\frac{3}{8}$.

Cor.—Put $m=n$; then $P=\$97\frac{1}{12}$, which is the correct result of this problem as proposed in the December, '94, Monthly.—*F. P. M.*

41. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

If I gain \$2 in \$5 by selling a horse for \$150, what per cent. would I gain by selling the horse for \$120?

Solution by P. S. BERG, Apple Creek, Ohio, and the PROPOSER.

Since gaining \$2 in \$5 is gaining 40%, the cost of the horse is \$$107\frac{1}{7}$. Hence the gain required is 12%.

PROBLEMS.

46. Proposed by T. W. PALMER, Professor of Mathematics, University of Alabama.

A borrows \$500.00 from a Building and Loan Association and agrees to pay